

3. (amended) The process of claim 1 wherein the organic additive is at least one compound selected from the group consisting of compounds comprising at least two hydroxyl groups and 2-10 carbon atoms, and the ethers and polyethers of these compounds.

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Remarks

Please note that the first named inventor for the instant application is Plantenga, F., not Michael Aleandrovich.

Rejection Under 35 USC § 112, second paragraph.

In claim 3 the term "(poly)ethers" means "ethers and polyethers". The basis for this interpretation can be found on page 8, lines 13-16 of the application. Claim 3 has been amended accordingly.

Rejection Under 35 USC § 103

The process of the present invention effects reduction of the sulfur content of a hydrocarbon feedstock to a value of less than 200 ppm by contacting it with a catalyst the composition of which includes an organic additive. A reduction of sulfur content to that level is known as ultra-deep hydrodesulfurization and claim 1 has been amended to make that clear by including that term. Support for the amendment to claim 1 may be found in the last paragraph beginning on page 1.

The cited reference Yamaguchi et al. (US 5,468,709) discloses a hydroprocessing catalyst that contains a Group VI metal, a Group VIII metal, alumina as support, phosphoric acid, and an additive. The additive is selected from dihydric or trihydric alcohols having 2-10 carbon atoms, ethers thereof, mono-, di- and polysaccharides (col. 4, lines 45-61). The catalyst is used in hydrodesulfurization of a light gas oil containing 1.15 wt.% of sulfur, and a vacuum gas oil containing 2.87 wt.% of sulfur (col. 9, lines 59-60; col. 47, lines

49-50). Apart from this data, this reference does not disclose any S content values of the hydrocarbon feed used or of the product obtained by the hydrodesulfurization process.

The subject-matter of claim 1 is different from the disclosure of Yamaguchi et al. in that the process of claim 1 is an ultra-deep hydrodesulfurization process, in which the sulfur content of a hydrocarbon feedstock originally containing 500 ppm or less of sulfur is reduced to below 200 ppm. Yamaguchi et al. gives no hint to ultra-deep hydrodesulfurization treatment of a hydrocarbon feedstock originally containing 500 ppm or less of sulfur to obtain a hydrocarbon having a sulfur content below 200 ppm. Therefore, as the Examiner has acknowledged, the subject-matter of the present application is novel over the disclosure of Yamaguchi et al..

As explained in the application (page 2, line 7-page 3, line 20), it is well-known to the skilled person that the reactivity of the various S-containing compounds in a hydrocarbon feed to hydrodesulfurization is very different. This means that as hydrodesulfurization proceeds, first the S-containing compounds that are the most reactive are removed from the feed, followed by the removal of compounds having moderate reactivity, and finally by the removal of compounds having very low reactivity. Consequently, in ultra-deep hydrodesulfurization, where the concentration of S-containing compounds is very low, those S-containing compounds are present which are the most difficult to remove by hydrodesulfurization. Thus, there is no direct relationship between catalytic activity in conventional hydrodesulfurization and catalytic activity in ultra-deep hydrodesulfurization and for all practical purposes the two processes are unrelated and chemically distinct.

There would thus be no incentive for one of ordinary skill in the art to use in ultra-deep hydrodesulfurization a catalyst that is active in conventional hydrodesulfurization, and so arrive at the present invention, and, therefore, the

claimed invention could not be considered obvious over the teachings of Yamaguchi et al.

Furthermore, it would be incorrect in accordance with established law to say that it would be obvious to try the organic additive disclosed by Yamaguchi et al. in a catalyst for use in ultra-deep hydrodesulfurization. A rejection based on "obvious to try" that does not take into account the non-obvious properties of the materials involved has consistently been defeated. See, e.g. *Jones et al. v. Hardy*, 220 USPQ 1021.

EP 0 870 817 A describes a process for reducing the sulfur content of hydrocarbon feedstocks to a value of less than 500 ppm, or optionally less than 200 ppm (p. 2, lines 28-29; Example), in which process a feedstock with a 95 % boiling point of 450°C or less and a sulfur content of 0.1 wt.% or more is contacted in the presence of hydrogen at elevated temperature and pressure with a first catalyst comprising a Group VIB metal component and a Group VIII metal component on an oxidic carrier, after which at least part of the effluent from the first catalyst is led to a second catalyst comprising a Group VIB metal component and a Group VIII metal component on an oxidic carrier which comprises 1-15 wt.% of silica, based on the weight of the catalyst (Abstract; claims 1,2). The presence of silica in the carrier of the second catalyst results in an increased hydrodesulfurization activity (Example).

EP 0 870 817 A does not disclose or suggest a hydrodesulfurization process where the catalyst used contains an organic additive. For reasons given above, there is absolutely no incentive for one skilled in the art to use the organic additive of Yamaguchi et al. in the catalyst of EP 0 870 817 A. The process of the present invention, in which the use of a catalyst containing an organic additive is critical, is certainly novel and unquestionably non-obvious over this reference in view of Yamaguchi et al.



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Conclusion

The reasoning of the Examiner regarding obviousness of the present invention over Yamaguchi et al or over the combination of Yamaguchi et al. and EP 0 870 817 A. is clearly incorrect. As discussed above, a skilled person would have no reason to expect that using an additive that increases catalytic activity in ordinary hydrodesulfurization would also result in an increasing activity in ultra-deep hydrodesulfurization. Therefore, the claimed subject-matter is non-obvious over Yamaguchi et al or the combination of Yamaguchi et al. and EP 0 870 817 A.

It is respectfully requested that instant claims 1-9 be allowed and that the present application proceed to issue in due course.

Respectfully submitted,

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Appendix A, Marked-up Version of Amended Claims

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1. (amended) A process for ~~reducing the sulfur content~~ the ultra-deep hydrodesulfurization of a hydrocarbon feedstock to a ~~value~~ sulfur content of less than 200 ppm, comprising subjecting a catalyst comprising a Group VIB metal component, a Group VIII metal component, and an organic additive on a carrier to a sulfidation step, and contacting a feedstock with a 95% boiling point of 450°C or less and a sulfur content of 500 ppm or less with the sulfided catalyst under conditions of elevated temperature and pressure to form a product with a sulfur content of less than 200 ppm.

3. (amended) The process of claim 1 wherein the organic additive is at least one compound selected from the group consisting of compounds comprising at least two hydroxyl groups and 2-10 carbon atoms, and the ~~(poly)~~ethers and polyethers of these compounds.